



RS232 to Ethernet Protocol Converter

User's Manual

Version 1.11

2-Oct-06

(For SitePlayer Telnet Software Version 1.4ahu and above)



**POE version depicted*



NetMedia, Inc.
10940 N. Stallard Place
Tucson, Arizona 85737
TEL: (520) 544-4567
FAX: (520) 544-0800

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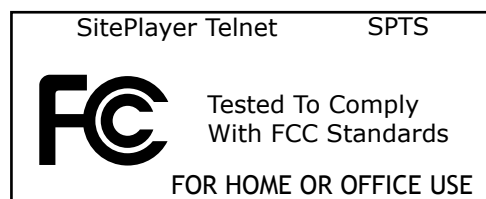
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Conventions

Certain conventions are used throughout this reference document:

- The term Siteplayer and SitePlayer Telnet is used interchangeably.
- Web screen shots may not appear exactly the same between various web browsers and operating systems.

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Introduction

SitePlayer Telnet is an RS232 to Ethernet protocol converter. It allows you to connect legacy RS232 devices to the internet by providing a TCP/IP telnet session to an RS232 port. SitePlayer Telnet is configured using a standard web browser. A variety of parameters may be configured for both the serial port and the internet connection.

With SitePlayer Telnet you will be able to make an RS232 serial device accessible from any where there is an internet connection. You will no longer be restricted by wiring limitations. If you have access to the internet, you will be able to also access SitePlayer. There are many devices which can only be controlled via RS232. With SitePlayer you can now control these devices through the internet. You can also use two SitePlayer Telnet devices to create an internet bridge between two serial devices.

This document describes the SitePlayer Telnet product which comes completely assembled including SitePlayer Module, Telnet carrier board and case. If you have purchased just the SitePlayer Module, you will find a schematic in Appendix B of the non Power Over Ethernet Telnet carrier board which will help illustrate how to connect the SitePlayer module to external devices. Appendix B also contains the pin-out for the SitePlayer Module. If you are using just a SitePlayer Module, please keep in mind that the signal levels described in this document are RS232 levels, and that the module levels will be inverted.

Distinguishing Various SitePlayer Telnet Models

Below you will find several SitePlayer Telnet Systems illustrated so that you can distinguish between them.

Original Siteplayer Telnet



- 7.5VDC Power requirements
- External 110VAC 60hz power adapter

MAC:00 03 75 XX XX XX
SitePlayer Telnet
©2002-2005 NetMedia, Inc.



POE Siteplayer Telnet (RoHS)



- 5.0VDC (optional) Power requirements
- External 100-240VAC 50/60Hz universal power adapter
- POE compatible RJ-45 with 2 LEDs

MAC:00 03 75 XX XX XX
SitePlayer Telnet - RoHS
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POE Siteplayer Telnet (non-RoHS)



- 5.0VDC (optional) Power requirements
- External 100-250VAC 50/60Hz universal power adapter
- POE compatible RJ-45 with 2 LEDs

MAC:00 03 75 XX XX XX
SitePlayer Telnet
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Specifications

Some of SitePlayer Telnet's features include

- Compact size
- RJ45 10BaseT Ethernet interface
- Binary data or Network Virtual Telnet (NVT) transfer using TCP/IP
- Binary data transfer using UDP
- Full configurable RS232 DB-9 serial port
 - Baud rate selection from 50 to 115000 baud
 - Parity selection Odd, Even or none
 - Flow control selection RTS/CTS, XON/XOFF or none
 - Data bit selection 7 or 8 bit
 - Control signals available RTS, CTS, DTR, DSR, DCD and RI
 - Parameters setable via web page or Telnet NVT commands
- Device configured via a web browser. Web browser can be password protected
- Flash ROM software updates can be uploaded to device using web browser
- Can be configured as a Server or Client using web page or AT-Modem type commands
- Conforms to various internet standards:
 - ARP
 - TCP/IP
 - UDP
 - DHCP
 - Link Local / Bonjour
 - ICMP Ping
 - HTTP
 - Telnet
 - Daytime protocol
 - Discard protocol
- TCP/IP or UDP ports may be protected using source IP and mask
- Up to 4 IP addresses configurable
 - DHCP
 - Link Local
 - 2 static IP addresses
- OEM custom webpages available
- Single LED indicates online status
- Power Over Ethernet (POE) version:
 - Class 1 POE device
 - LEDs for Link and Power
 - Optional 100-240VAC 50/60Hz to 5VDC power adapter included for non-POE applications
 - Input power requirements 5.0VDC at 150ma for non-POE applications
- Non-POE version
 - External 110VAC to 7.5VDC power adapter included
 - Input power requirements 7.5VDC at 150ma
- Dimensions (HxWxD) 0.95 x 2.2 x 2.69 in (2.4 x 5.6 x 6.8 cm)
- FCC Class B

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to different outlet on a circuit other than the one the receiver is connected to.
- Consult the dealer or an experienced radio/TV technician for help.

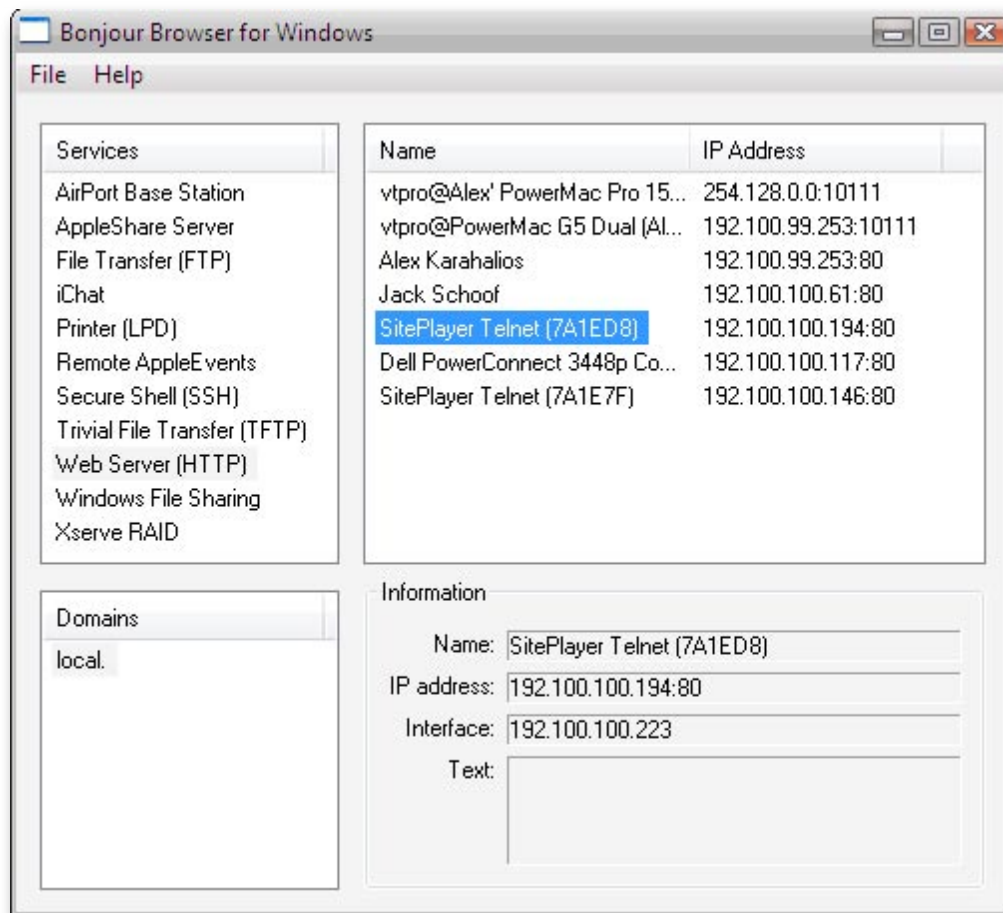
Configuration and Setup

SitePlayer Telnet uses Link Local and multicast DNS (also known as Bonjour) to advertise its presence on the network. You can use a Bonjour browser to locate SitePlayer Telnet and then use a standard web browser to configure SitePlayer. Some web browsers, such as Apple's Safari, have a built in Bonjour browser. Other web browsers, such as Internet Explorer, can have a Bonjour plug-in installed for them. For Windows users the easiest thing to do is download the "Bonjour Browser.exe" file from the NetMedia web site at

<http://www.SitePlayer.com/telnet/>

See Appendix A for more Bonjour browser options.

Once you run Bonjour Browser you will see a window similar to the following



Each SitePlayer Telnet has a unique name associated with it which you can change later on. The factory default name is in the form SitePlayer Telnet (XXXXXX), where XXXXXX are the last 3 digits of the SitePlayer's MAC address in hex. Double clicking on the Name will run your web browser and attempt to connect to the SitePlayer Telnet Setup web page.

When your browser connects to SitePlayer, you will be greeted with an authentication window requesting your username and password.

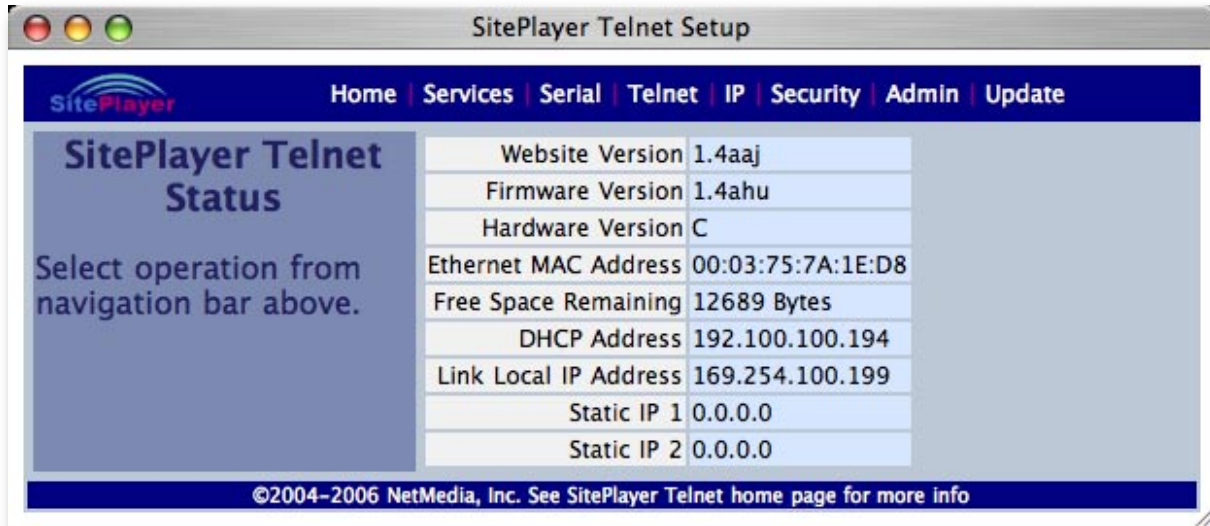
The factory default username is **user** and the factory default password is **password**. Usernames and passwords are case sensitive. You will have an opportunity later on to change these if you wish.



Once you type the username and password you will see the main SitePlayer Telnet Setup page.

The following sections describe the main SitePlayer Telnet Setup page and the other web pages which are used to configure SitePlayer.

SitePlayer Telnet Setup Web Page



This is the first page you will see when you connect to SitePlayer Telnet's web server.

The navigation bar at the top of the web page allows you to change various SitePlayer settings. You will find this navigation bar on all the SitePlayer pages. The various pages available are

- **Home** - returns you to the SitePlayer Telnet Setup page.
- **Services** - allows you to change the SitePlayer device name and the TCP or UDP ports that various Siteplayer services use.
- **Serial** - allows you to change serial port parameters such as baud rate and stop bits.
- **Telnet** - allows you to view the current Telnet status and configure SitePlayer as a Telnet client or server and how it will connect and disconnect to remote Telnet servers.
- **IP** - allows you to enable / disable DHCP and specify additional static IP addresses.
- **Security** - allows you to change the web page username and password and limit access to SitePlayers TCP or UDP ports to certain IP addresses.
- **Admin** - allows you to perform administration functions on SitePlayer such as Link LED control, restarting (rebooting) Siteplayer or setting it back to factory defaults.
- **Update** - allows you to load new Firmware or Web pages into SitePlayer.

Each SitePlayer web page contains a footer which can be clicked to access the SitePlayer Telnet home page.

The SitePlayer Telnet Setup page gives you a quick overview of some of SitePlayer's settings:

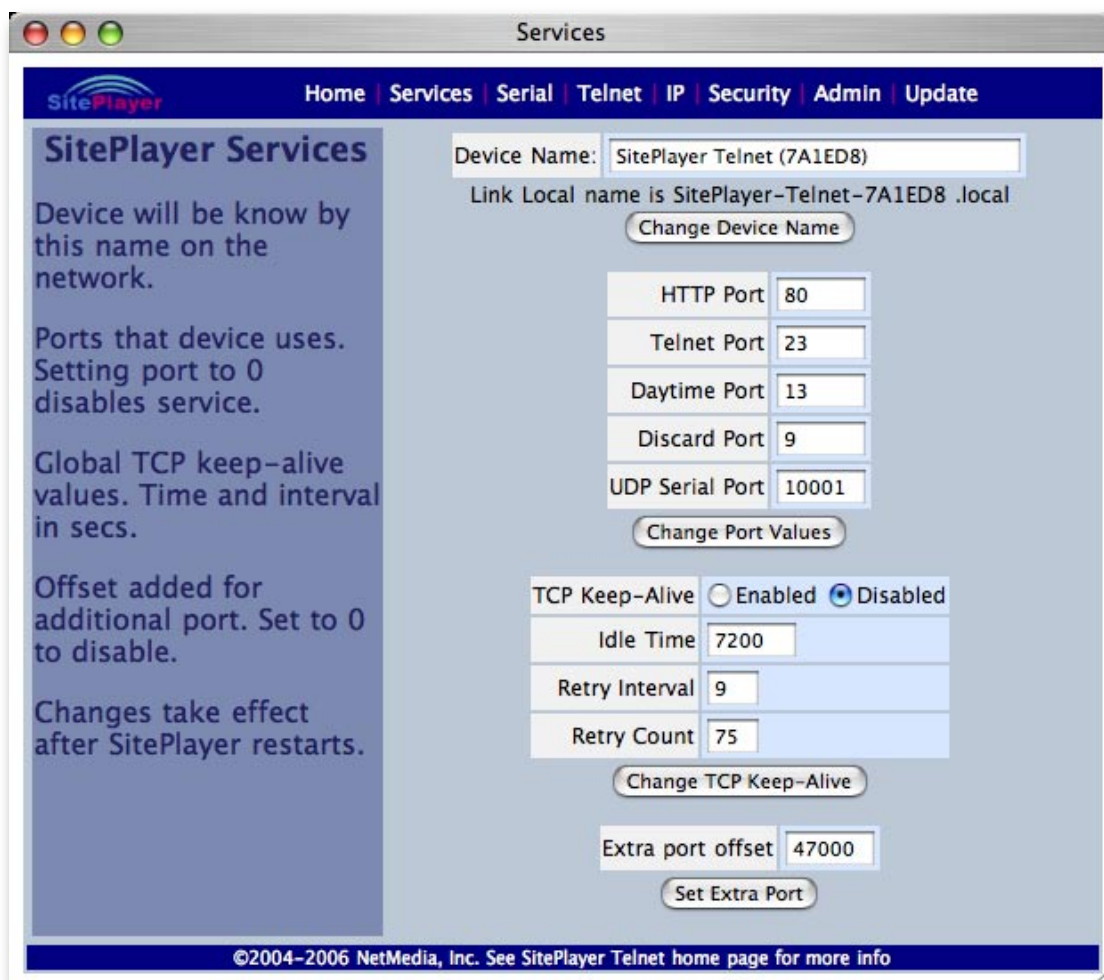
- **Website Version** - shows the current Website version number. You can load new Website software using the Update page.
- **Firmware version** - shows the current Firmware version number. You can load new Firmware using the Update page.
- **Hardware Version** - shows the hardware version that SitePlayer is running on. SitePlayer Telnet was initially released with revision B of the hardware. Revision C and above of the hardware is RoHS compliant.
- **Ethernet MAC Address** - shows SitePlayer's Ethernet MAC address. Each SitePlayer has a unique MAC address.
- **Free Space Remaining** - shows how much free space is remaining in SitePlayers persistent (flash)

storage. SitePlayer stores configuration parameters in persistent storage. If persistent storage space is exhausted, you will need to reset SitePlayer back to factory defaults to reclaim the space.

- **DHCP Address** - shows your current DHCP address. A value of 0.0.0.0 means that a DHCP address has not been obtained either due to the DHCP server not having allocated one or DHCP being disabled.
- **Link Local IP Address** - shows your current link local (LL) address. Each SitePlayer automatically generates it's own LL address which is unique on the local network. LL addresses are not routable and thus cannot be accessed outside of the local network. If you need a routable address, you should use a DHCP or Static IP address.
- **Static IP 1 & 2** - shows each static IP address that SitePlayer will respond to. A value of 0.0.0.0 means that no Static IP address has been configured.

Any changes that are made to SitePlayer parameters are saved in persistent storage. Most changes to SitePlayer parameters force SitePlayer to restart, so you should be careful not to change these parameters while there are other network connection to SitePlayer or else these connections will be lost.

Services Web Page



SitePlayer Services

Device will be know by this name on the network.

Ports that device uses. Setting port to 0 disables service.

Global TCP keep-alive values. Time and interval in secs.

Offset added for additional port. Set to 0 to disable.

Changes take effect after SitePlayer restarts.

Device Name: SitePlayer Telnet (7A1ED8)

Link Local name is SitePlayer-Telnet-7A1ED8.local

Change Device Name

HTTP Port	80
Telnet Port	23
Daytime Port	13
Discard Port	9
UDP Serial Port	10001

Change Port Values

TCP Keep-Alive ☐ Enabled ☒ Disabled

Idle Time	7200
Retry Interval	9
Retry Count	75

Change TCP Keep-Alive

Extra port offset 47000

Set Extra Port

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The Services web page allows you to change the SitePlayer device name, the TCP or UDP ports that various Siteplayer services use, various TCP keep-alive parameters and an extra port offset.

Change Device Name

The device name is the name that SitePlayer uses to advertise its services and is seen by the Bonjour browser. The factory default name is in the form SitePlayer Telnet (XXXXXX), where XXXXXX is the last 3 digits of the SitePlayer's MAC address in hex. You can change the name to anything up to 32 characters. You should try to keep names unique on your network if you are using multiple SitePlayers to more easily distinguish among them.

This web page also displays the Link Local name. The link local name is a DNS safe name that is derived from the device name. Operating system which support the mDNS protocol allow you to address SitePlayer using the Link Local name.

Change Port Values

You can also change the various port numbers for the protocols that SitePlayer supports. Normally you will leave these port numbers at their default values. The protocols whose port numbers you can change are

- **HTTP** - This is the http protocol which is used to communicate with SitePlayers web server.
- **Telnet** - This service is used to pass data between a network connection and the serial port.
- **Daytime** - This service is used to get the amount of elapsed time that SitePlayer has been running.
- **Discard** - This service throws away any data that is sent to it. Used mostly for speed testing.
- **UDP Serial** - This is a SitePlayer specific protocol which uses UDP to send and receive serial data.

The port values for Telnet and UDP Serial protocols will be used as source port values when SitePlayer is in Client mode.

See **SitePlayer Services and Protocols** section for more details about the protocols and how to use them.

Change TCP Keep-Alive

You can enable and change various parameters which control SitePlayer's keep-alive mechanism. The keep-alive mechanism will terminate network connections if a computer is not reachable for a period of time. The parameters which can be changed here are global and effect all SitePlayer TCP/IP protocols/services (i.e. HTTP, Telnet, Daytime and Discard).

Normally TCP/IP connections are maintained indefinitely. This means that intermediate computers and routers can go down and come back up and TCP/IP will not care. This can cause problems in certain cases when a computer connected to SitePlayer goes down. SitePlayer will maintain the connection to its service for the computer because it has no way of knowing the computer has been shut down. Because a connection is still maintained for a particular service, SitePlayer will not allow other computers to connect to that service.

To remedy this problem you can enable TCP Keep-Alive. You can fine tune the keep-alive mechanism by altering various parameters

- **Idle Time** - specifies the amount of time in seconds to wait before sending a probe packet to determine if the other end is still active. The default value of 7200 is 2 hours.
- **Retry Interval** - specifies the amount of time in seconds between successive probe packets. The default is 9 seconds.
- **Retry Count** - specifies the number of times probe packets will be retried before the connection is terminated. The default value is 75 times.

Set Extra Port

All SitePlayer services can be accessed at their default port numbers. The extra port value is a number which is added to the default port number which allows SitePlayer to also be accessed at different port number. For example, by default SitePlayer's web pages can be accessed at port 80. The default extra port value of 47000 allows SitePlayer to also be accessed at port 47080. If you need to disable this feature, just set the extra port value to 0.

The extra port value can be used, for example, in a NAT router to forward TCP/IP data in a certain port range to a SitePlayer. You could set port 47080 to be forwarded to a SitePlayer on the local network while the NAT router's web page was externally accessible as port 80.

Serial Web Page

Serial Port

Serial port parameters are changed here. Changes are immediate and are retained in persistent storage.

UDP Serial Configuration

UDP Serial configuration is changed here. Changes take effect after SitePlayer restarts.

Buffer Management

You can change how Siteplayer's buffers are managed. Changes take effect after SitePlayer restarts.

Serial Port Parameters:

Baud Rate	115200
Data Bits and Parity	8 Bits No Parity
Flow Control	None

Set Parameters

UDP Serial Configuration:

UDP Remote IP	192 . 100 . 100 . 129
Remote IP is	<input checked="" type="radio"/> Fixed <input type="radio"/> Changeable
UDP Timeout	20

Set UDP Configuration

Buffer Management:

Buffer Threshold	125
End of Buffer Byte is	<input checked="" type="radio"/> Disabled <input type="radio"/> Enabled
End of Buffer Byte	10
Bit stall delay is	<input type="radio"/> Disabled <input checked="" type="radio"/> Enabled
Bit stall delay	15

Set Buffer Management

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The Serial web page allows you to change various parameters that deal with the serial port hardware. You can also change some parameters which deal with the UDP serial protocol here.

Serial Port Parameters

You can change several serial port parameters. These parameters control the serial port hardware.

Baud Rate

You can select from one of the following baud rates

- 110
- 134.5
- 150
- 300
- 600
- 1200
- 2400
- 4800
- 9600
- 19200
- 31250
- 38400

- **57600**
- **115200**

The default baud rate is 115200.

SitePlayer will buffer data, but high data rates will cause buffer overflows. Several variables including network latency makes determining the optimal baud rate difficult. It is best to enable some kind of flow control (i.e. XON/XOFF or RTS/CTS) to ensure that the serial port buffers are not overrun.

Data Bits and Parity

You can set one of the following data Bits and parity combinations

- **7 Bits Even Parity**
- **7 Bits Odd Parity**
- **7 Bits Mark Parity**
- **7 Bits Space Parity**
- **8 Bits No Parity**
- **8 Bits Even Parity**
- **8 Bits Odd Parity**
- **8 Bits Mark Parity**
- **8 Bits Space Parity**

The default is 8 Bits No Parity.

Flow Control

Flow control may be set to one of the following

- **None** - No flow control is performed. Data may be lost at high baud rates.
- **XON/XOFF** - XOFF (^S) is sent to stop data flow; XON (^Q) is sent to resume data flow
- **RTS/CTS** - the RTS and CTS hardware lines are used to control data flow.

In order for flow control to work properly, you must also set the device that you are connecting to SitePlayer to the same flow control settings.

Press the "Set Parameters" button to have the changes take effect immediately. SitePlayer is *not* restarted when you change serial port parameters.

UDP Serial Configuration

The UDP Serial configuration allows you to specify how SitePlayer's UDPS protocol will operate. See **SitePlayer Services and Protocols** section for more details on how to use the UDPS protocol.

UDP Remote IP

Specifies the remote IP address that SitePlayer will use to send data. If UDP Remote IP is set to 0.0.0.0 then this means that SitePlayer will not send UDP data until it has received UDP data and can determine the IP address to send to. Once SitePlayer has determined the remote IP address it will send any data to that address.

You can specify both unicast and broadcast/multicast IP addresses in this field.

Remote IP is

This allows you to specify how the Remote IP address will be treated.

- **Fixed** - The remote IP address will not change when a UDP packet is received. If the UDP Remote IP address is 0.0.0.0, then it will change once to reflect the UDP IP address of the first UDP packet received.
- **Changeable** - The remote IP address will change to reflect the IP address of the recently received packet. All future packets will be sent to this new address.

UDP Timeout

UDP Timeout is the period measured in ticks (1 tick is 10ms). This is the time, after the last character is received, that SitePlayer waits before sending any data it has in its buffer to the remote node via UDP. The internal buffer can store about 250 bytes, so UDP transmissions from SitePlayer should be kept smaller than that (unless your device supports flow control.)

Press the "Set UDP Configuration" button to have the changes take effect and restart SitePlayer.

Buffer Management

Buffer Management, which operates in both in UDP and TCP/IP modes, allows you to select how SitePlayer's serial receive buffer is managed. You can specify at which point data in the serial buffer will be sent to the remote end. The buffer management conditions are used to help SitePlayer determine when the end of a serial reception has been reached. They are not buffer formatting or packetizing parameters. SitePlayer takes a best effort approach in sending data when any of the below buffer management conditions are satisfied.

For example, at baud rates greater than about 2400 baud and in UDP mode, some extra characters may be sent after an End of Buffer Byte or any other buffer management condition (in TCP/IP mode, the remote end only gets the characters that it requested so no "extra" bytes are sent.)

A benefit of the buffer management parameters, especially the Bit Stall Delay, is that character latency is very low. For example, in TCP/IP mode, placing a loopback serial connector on SitePlayer and sending a single byte from a remote host will yield responses in the order of 8ms.

Buffer Threshold

When the number of bytes in the serial receive buffer reaches this value, SitePlayer sends the bytes in the buffer to the remote IP Address. The default value of 125 is one-half the buffer size. The buffer threshold is active when no flow control is selected.

End of Buffer Byte is

This allows you to enable or disable SitePlayer's checking for an end of buffer byte. The default is that end of buffer byte checking is disabled.

- **Enabled** - Enables detection of the end of buffer byte.
- **Disabled** - Disables detection of the end of buffer byte (default).

End of Buffer Byte

This specifies the byte value (in decimal) which will be used as a trigger to indicate to SitePlayer that the buffer should be sent. The default value of 10 is the Line-Feed character which is useful in sending data that is line oriented.

Bit Stall Delay is

This allows you to enable or disable SitePlayer's checking for a stall in character reception. A stall is a discontinuity in reception due to the sender stopping its transmission for a period of time. SitePlayer measures the stall time in number of bits of the current baud rate. This allows SitePlayer to quickly determine when a serial reception has terminated which in turn will cause the data to be immediately sent to the remote end.

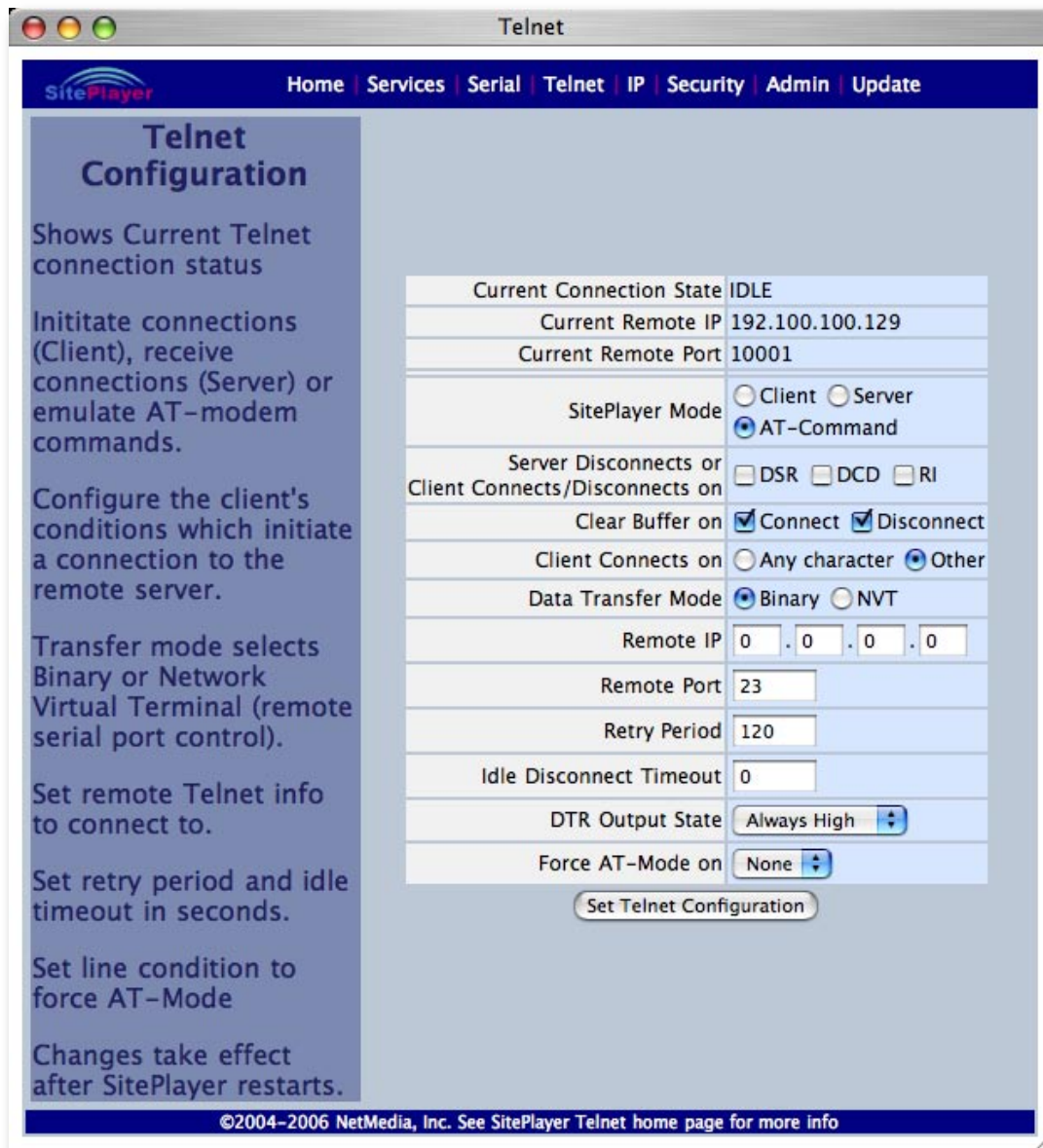
- **Enabled** - Enables bit stall delay checking (default).
- **Disabled** - Disables bit stall delay checking.

Bit Stall Delay

The amount of bit stall delay measured in bits of the current baud rate. The default value of 15 corresponds to about 1.5 character times since most characters take 10 bits. The bit delay value should be chosen such that it is no larger than about 1/50th of a second since that is the largest value that SitePlayer can use for a stall delay amount. Larger bit stall delays may be helpful in preventing SitePlayer from sending its receive buffer prematurely when the sender is slow in sending successive characters.

Press the "Set Buffer Management" button to have the changes take effect and restart SitePlayer.

Telnet Web page



Telnet Configuration

Shows Current Telnet connection status

Initiate connections (Client), receive connections (Server) or emulate AT-modem commands.

Configure the client's conditions which initiate a connection to the remote server.

Transfer mode selects Binary or Network Virtual Terminal (remote serial port control).

Set remote Telnet info to connect to.

Set retry period and idle timeout in seconds.

Set line condition to force AT-Mode

Changes take effect after SitePlayer restarts.

Current Connection State	IDLE
Current Remote IP	192.100.100.129
Current Remote Port	10001
SitePlayer Mode	<input type="radio"/> Client <input type="radio"/> Server <input checked="" type="radio"/> AT-Command
Server Disconnects or Client Connects/Disconnects on	<input type="checkbox"/> DSR <input type="checkbox"/> DCD <input type="checkbox"/> RI
Clear Buffer on	<input checked="" type="checkbox"/> Connect <input checked="" type="checkbox"/> Disconnect
Client Connects on	<input type="radio"/> Any character <input checked="" type="radio"/> Other
Data Transfer Mode	<input checked="" type="radio"/> Binary <input type="radio"/> NVT
Remote IP	0 . 0 . 0 . 0
Remote Port	23
Retry Period	120
Idle Disconnect Timeout	0
DTR Output State	Always High
Force AT-Mode on	None

Set Telnet Configuration

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The Telnet Web page allows you to view the current Telnet connection status and also control whether SitePlayer acts as a Telnet server or client. As a server, SitePlayer waits for connections to its port (default 23). As a client SitePlayer will initiate connections to other Telnet servers or TCP/IP programs. There are several parameters which allow you to specify how SitePlayer initiates connections to other Telnet servers or programs.

The current Telnet Connection Status includes

Current Connection State

The state that the Telnet session is currently in. See Appendix A for a list of states and their explanation . You can use this field to determine if anyone is currently connected to SitePlayer's Telnet port.

Current Remote IP

The remote IP address that SitePlayer Telnet is currently connected to. An address of 0.0.0.0 means that SitePlayer is currently not connected to anyone.

Current Remote Port

The remote TCP/IP port that SitePlayer is connected to. A port of 0 means SitePlayer is not connected to a remote computer.

Parameters you can select are

SitePlayer Mode

This option controls which mode SitePlayer will operate in.

- **Client** - SitePlayer acts as a client initiating connections based on parameters listed below. If any of the parameters below are not selected and SitePlayer is in Client mode, then it will unconditionally initiate a connection. This means that once one of the parameters below are selected, then SitePlayer will connect only on those parameters (and not unconditionally.)
- **Server** - SitePlayer acts as a server passively listening for a connection to its port (default 23). You can change the default port in the Services Web page.
- **AT-Command** - SitePlayer responds to AT-Modem type commands received from its serial port. See Appendix A - AT Command Set for a description of the various AT Commands SitePlayer understands. In AT-Command mode SitePlayer is neither a Server nor Client until set by an appropriate AT command.

Server Connects or Client Connects/Disconnects on

This option controls whether SitePlayer can connect or disconnect on various serial port line states. In client mode, SitePlayer will connect when *any* of the selected lines are high. It will disconnect when *all* the selected lines are low. In Server mode, a low line will cause a disconnect. You need to be aware that in Server mode whatever control line(s) you select, at *least one* needs to be high before a connection is established. If they are all low, then the connection will be terminated right after it is made. The signal levels (High/Low) described here are RS232 levels. If you are using just a SitePlayer Module, the logic levels will be inverted.

- **DSR** - Connect on high DSR line ; disconnect on low DSR line.
- **DCD** - Connect on high DCD line; disconnect on low DSD line.
- **RI** - Connect on high RI line; disconnect on low RI line.

Clear Buffer on

This option controls when and if SitePlayer should clear its serial port buffers. This affects both client and server modes.

- **Connect** - clears serial port receive and transmit buffers before a connection is established.
- **Disconnect** - clears serial port receive and transmit buffers after a connection is terminated.

Client Connects on

This option controls whether a client will connect when a character is received. This does not preclude the client connecting for other conditions.

- **Any Character** - Client connects when any character is received on the serial port.
- **Other** - Client will not connect on a character reception, but may connect on other conditions.

Data Transfer Mode

This option controls how data will be interpreted and transferred across the network connection.

- **Binary** - Data will flow with no interpretation. All 8 bits of each character will be transferred unchanged.
- **NVT** - TCP/IP data received will be interpreted as Telnet Network Virtual Terminal commands. In general, all data received will be transferred unchanged unless it is preceded by a 255 (FF hex) character. Serial data received by SitePlayer will be sent unchanged to the remote TCP/IP connection, unless it's the 255 character, in which case two 255 characters will be automatically sent. See Appendix A - Telnet Network Virtual Terminal (NVT) for more details.

Remote IP

The Remote IP specifies the remote IP address that a Telnet client connects to. The remote address may be a connection to a Telnet server or any other TCP/IP connection including another SitePlayer running in Server mode.

Remote Port

The Remote Port specifies the remote port number that a Telnet client connects to. The remote port may be to a Telnet server or any other TCP/IP connection including another SitePlayer running in Server mode.

Retry Period

The Retry Period specifies the amount of time that a Telnet client waits after a TCP disconnect or failed connection before attempting to connect again. A value of 0 causes SitePlayer to retry immediately.

Idle Disconnect Timeout

The Idle disconnect Timeout specifies the amount of time in seconds to wait after no characters are received or sent before the TCP/IP connection is terminated. The idle disconnect timeout may be used in both Client and Server modes. An Idle Disconnect Timeout of 0 disables the feature.

DTR Output State

DTR Output State specifies what state the DTR line output will be in and how Telnet will control it. This can be useful when you have a microprocessor or other device which needs to know if a connection has been established. The DTR line may briefly fluctuate when SitePlayer is first started or after a reset. Your attached device will need to wait a few seconds after power is applied or after SitePlayer is reset before reading the DTR line. The signal levels (High/Low) described here are RS232 levels. If you are using just a SitePlayer Module, the logic levels will be inverted.

- **Always High** - DTR line will always be high (default).
- **Always Low** - DTR line will always be low.
- **Connect High** - DTR line will be high when SitePlayer has an established connection on its Telnet port. This applies to both client and server modes. The DTR line will be low when the connection is terminated.
- **Connect Low** - DTR line will be low when SitePlayer has an established connection on its Telnet port. This applies to both client and server modes. The DTR line will be high when the connection is terminated.

SitePlayer polls every second for various conditions to change. The above input parameters may take up to one second before they are noticed. This means, for example, the changes in the serial port line states may take up to a second before they are detected. The serial hardware lines should, therefore, be kept constant for at least one second.

Force AT Mode on

AT command mode may be forced to be enabled when a RS232 hardware control line is brought high. The signal levels (High/Low) described here are RS232 levels. If you are using just a SitePlayer Module, the logic levels will be inverted. When the line is brought low, AT mode is exited and SitePlayer resumes operating in its previous mode.

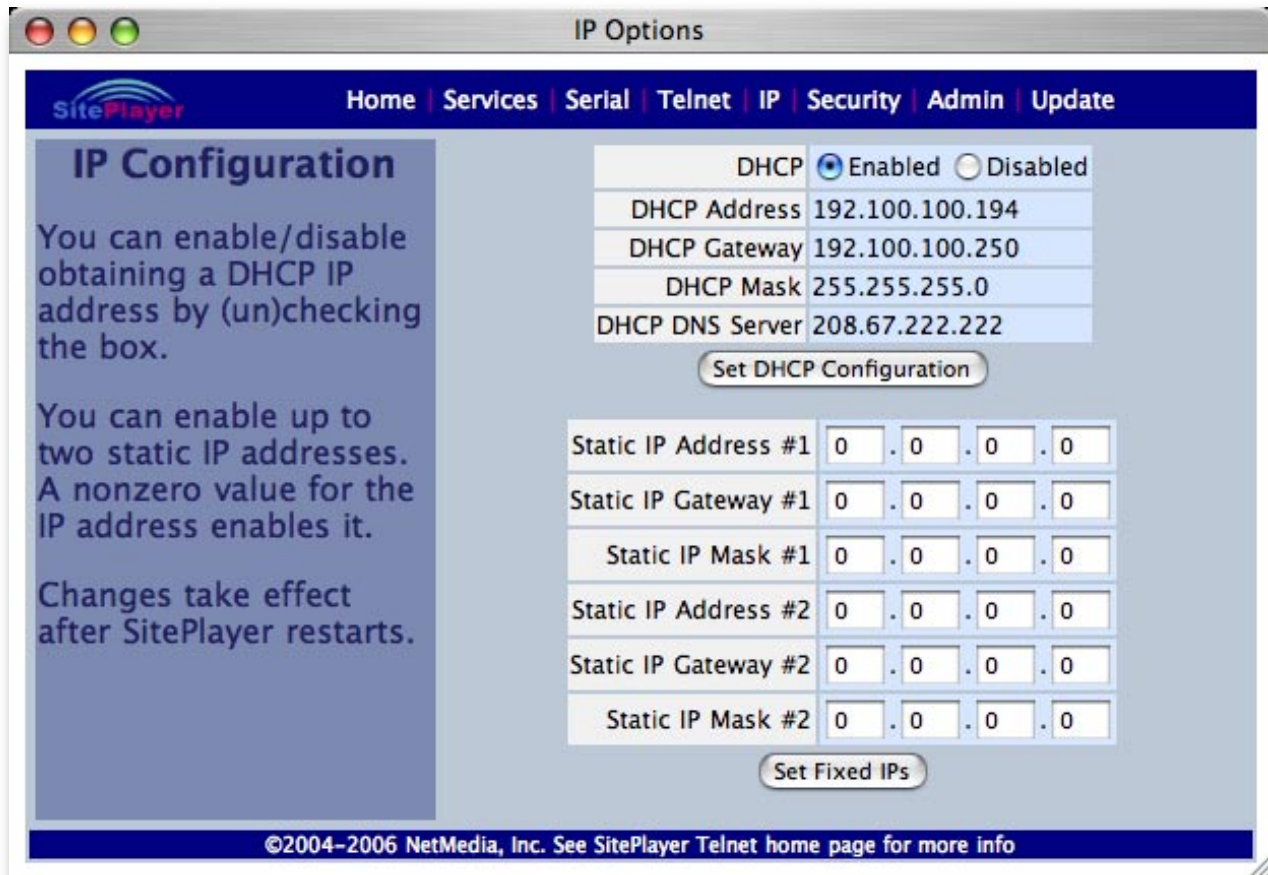
- **None** - AT mode forcing is disabled (default).
- **DSR** - AT mode is forced when DSR is high.
- **DCD** - AT mode is forced when DCD is high.
- **RI** - AT mode is forced when RI is high.

When AT command mode is forced, SitePlayer will act as if it is in AT mode and start accepting AT commands. If SitePlayer has Server mode enabled, it will continue listening for connections and thus you may get a *CONNECT* or *NO CARRIER* message. If SitePlayer has Client mode enabled, it will continue to attempt to connect to the remote end and you may also get a *CONNECT* or *NO CARRIER* message.

SitePlayer polls every tenth of second (1/10s) for force-AT-mode control lines to change. The above input parameters may take up to one tenth of a second before they are noticed. This means, for example, the changes in the serial port line states may take up to a tenth of a second before they are detected. The serial hardware lines should, therefore, be kept constant for at least a tenth of a second.

You should make sure that these control lines do not interfere with the *Server Connects or Client Connects/Disconnects* control lines. You should choose different lines for both these functions.

IP Web Page



IP Configuration

You can enable/disable obtaining a DHCP IP address by (un)checking the box.

You can enable up to two static IP addresses. A nonzero value for the IP address enables it.

Changes take effect after SitePlayer restarts.

DHCP	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled
DHCP Address	192.100.100.194
DHCP Gateway	192.100.100.250
DHCP Mask	255.255.255.0
DHCP DNS Server	208.67.222.222

Set DHCP Configuration

Static IP Address #1	0 . 0 . 0 . 0
Static IP Gateway #1	0 . 0 . 0 . 0
Static IP Mask #1	0 . 0 . 0 . 0
Static IP Address #2	0 . 0 . 0 . 0
Static IP Gateway #2	0 . 0 . 0 . 0
Static IP Mask #2	0 . 0 . 0 . 0

Set Fixed IPs

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The IP Web page allows you to specify how SitePlayer acquires an IP address. You can enable or disable DHCP address acquisition or you can assign fixed IP addresses to SitePlayer.

DHCP Configuration

The current DHCP status is displayed along with the DHCP address, gateway, mask and DNS server that has been acquired. The only option you have is to enable or disable DHCP address acquisition.

Fixed IP Addresses

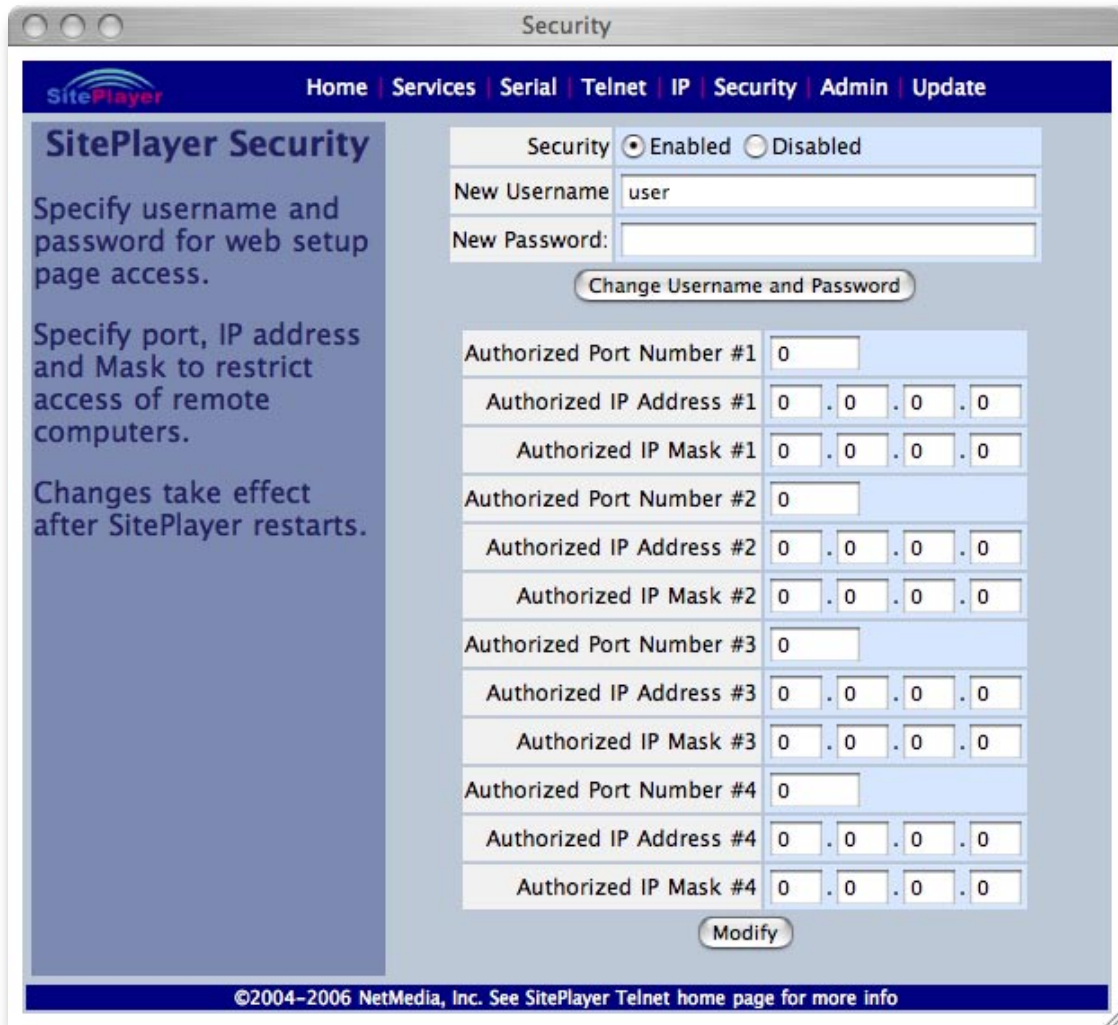
You can specify up to 2 static IP addresses. Static IP addresses can be used to give SitePlayer a known unchanging IP address. You will need to specify the IP address, gateway, and mask to properly set the static IP address. The gateway and mask values are used to initiate communications from SitePlayer to other computers. Some example values are

Static IP Address #1	192.168.1.50
Static IP Gateway #1	192.168.1.254
Static IP Mask #1	255.255.255.0

If you disable DHCP address acquisition and you don't specify any static IP addresses, the only IP address that SitePlayer will have is the automatically generated Link Local address. This may make SitePlayer more difficult to locate on a network if your computer does not support link local addressing. See **Appendix B - Adding Route to Windows so Link Local Devices Can be Accessed** if you have Windows and need to only use a link local address.

In order to have changes to the DHCP configuration or static IP addresses made, SitePlayer will automatically restart.

Security Web Page



The screenshot shows the 'Security' web page of SitePlayer. The page has a navigation bar with links: Home, Services, Serial, Telnet, IP, Security, Admin, and Update. The main content area is titled 'SitePlayer Security' and includes instructions: 'Specify username and password for web setup page access.', 'Specify port, IP address and Mask to restrict access of remote computers.', and 'Changes take effect after SitePlayer restarts.' The 'Security' section has radio buttons for 'Enabled' (selected) and 'Disabled'. Below this are input fields for 'New Username' (containing 'user') and 'New Password'. A 'Change Username and Password' button is present. The 'Authorized' section contains four rows, each with a 'Port Number' field (all set to '0') and two 'IP Address' and 'IP Mask' fields (all set to '0.0.0.0'). A 'Modify' button is at the bottom. The footer states '©2004-2006 NetMedia, Inc. See SitePlayer Telnet home page for more info'.

The Security Web page allows you to specify the level of protection you need for SitePlayer.

Change Username and Password

You can enable or disable username and password protection for SitePlayer's web pages. If you disable username/password security anyone can access SitePlayer's web setup pages. With security enabled all of SitePlayer's web setup pages will be protected with a username and password, although you will only need to enter this information once when you access the web page.

You can change the username and password for web access. Both the username and password are case sensitive. Only the username is displayed. The default username and password are

Default username	<i>user</i>
Default password	<i>password</i>

If you forget the username/password you will need to perform a hardware reset to set SitePlayer to its default username and password.

Authorized Port, IP address and Mask

You can specify up to 4 TCP ports that need protection. Ports may be protected so that only computers with certain IP addresses can have access to SitePlayer. For each protected port you can set three parameters:

- **Port Number** - the number of the port you wish to have protected. These port numbers should correspond to the port numbers in the Services web page. For example, the factory default port of 80 is used for HTTP. Access is only restricted for port numbers which are listed here. If a port number is not listed then it has no access restriction.
- **IP Address** - the complete or partial IP address that will have access to the port.
- **IP Mask** - a mask value which allows you to specify a range of IP addresses. The mask is ANDed with the IP address which is accessing SitePlayer and compared to the **IP Address** above.

Here are some examples,

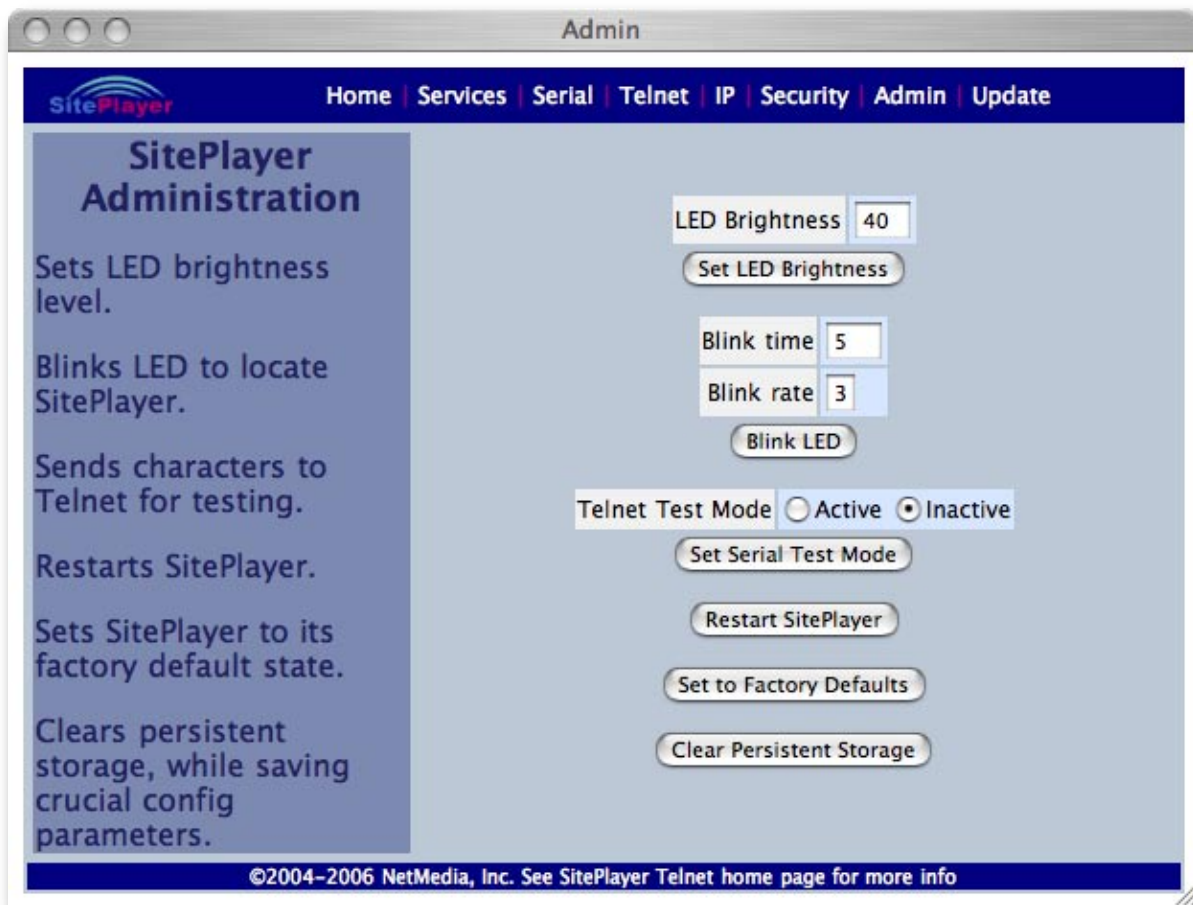
Port Number	80
IP Address	192.168.2.0
IP Mask	255.255.255.0

This will grant access to port 80 (the HTTP port) for anyone from the 192.168.2.0 subnet. That is IP addresses 192.168.2.0 to 192.168.2.255.

Port Number	23
IP Address	192.168.2.153
IP Mask	255.255.255.255

This will grant access to port 23 (the Telnet port) for anyone from IP address 192.168.2.153. Notice by setting the mask to 255.255.255.255 and specifying a full IP address, you can restrict access to just a single IP address.

Admin Web Page



The Admin Web page provides several options which help you manage SitePlayer. You can control the Link LED and force Siteplayer to restart (reboot) or to have SitePlayer set itself into a factory default configuration.

Set LED Brightness

You can control the brightness level of the Link LED.

- **LED Brightness** - specifies the LED brightness level. You can set a level from 0 to 255. A level of 0 turns off the LED and a level of 255 sets the LED brightness to its maximum. The default value of 40 sets the LED brightness to a medium-low level.

Press "Set LED Brightness" to change the brightness level. The brightness level will change immediately without SitePlayer restarting.

Blink LED

You can force the Link LED to blink for a period of time and at a certain rate. This is useful if you have several SitePlayers and you wish to know which SitePlayer you are controlling via the web interface. Once the LED finishes blinking it will revert to its original functionality.

- **Blink time** - specifies the amount of time the LED will blink in seconds. You can specify a value of 0 to 255.
- **Blink rate** - specifies how fast the LED will blink. You can enter a value of 0 to 7. 0 is the slowest blink rate and 7 is the fastest.

Press "Blink LED" to start the LED blinking immediately without SitePlayer restarting.

Telnet Test Mode

Telnet Test Mode is used to test SitePlayer's Serial and Network connection. It is primarily there for tests performed at the factory.

- **Active** - Test mode is activate (enabled)
- **Inactive** - Test mode is not active (not enabled)

Select which mode you want SitePlayer to be in and then press "Set Serial Test Mode." The Test Mode setting is not saved when you reflash SitePlayer.

To properly test SitePlayer using this mode, two SitePlayers are used. Their serial ports are connected together via a Null modem cable. Their Ethernet ports are either connected together via an Ethernet cross-over cable or through a hub. One SitePlayer is set as server and the other SitePlayer is set as client. At least one SitePlayer needs to be set to Active mode. The baud rates need to be the same on both SitePlayers and they must have some kind of flow control enabled.

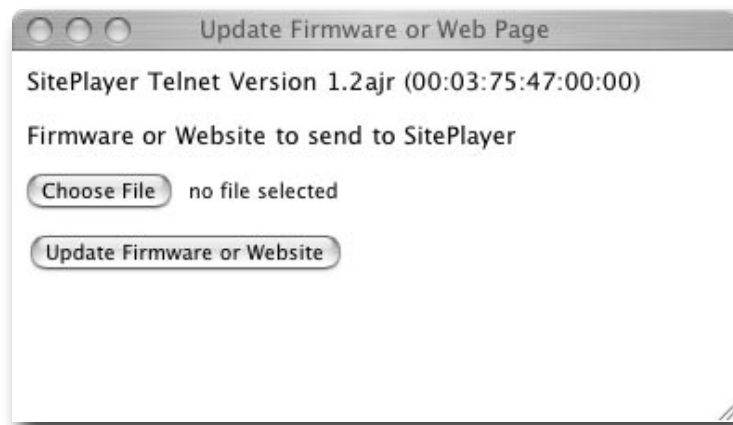
Both SitePlayers should be power up simultaneously, although they wait 15 seconds before they begin the test. Each SitePlayer in Active mode initiates the test by sending the characters 'A' through 'Z' to the other SitePlayer. Because the SitePlayers are wired in a loop, they send characters on the serial port and network continuously.

Restart SitePlayer

Press the "Restart SitePlayer" button to force Siteplayer to restart itself. Any active network connections will be lost when SitePlayer restarts.

Set to Factory Defaults

Press "Set to Factory Defaults" to cause SitePlayer to erase its persistent storage. SitePlayer will revert to a factory default configuration. The current Website will be erased, but the current Firmware will not be altered. This operation will take about 1 minute. During this time, SitePlayer's LED will be blinking indicating that the persistent storage is being erased. Do not remove power while this is happening. After the persistent storage is erased, SitePlayer will restart and revert to a minimal web page:



You should reload the WebSite ROM file so that you can reconfigure SitePlayer. See the **Update Web Page** section on how to reload the WebSite ROM file.

Clear Persistent Storage

Press the "Clear Persistent Storage" button to have SitePlayer erase its Persistent Storage. The current Website will be erased, but the current Firmware will not be altered. Before erasing the persistent storage SitePlayer will attempt to save the current configuration parameters so they may be restored after persistent storage is erased. This is useful when persistent storage is getting full and you want to reinitialize it, but don't want to lose your configuration parameters. If power is lost during this operation, then it is likely that the current configuration parameters were not saved and restored.

Update Web Page



The Update web page allows you to load new Firmware or WebSite ROM software. You will do this when new software becomes available. You can also do this to reload the current software. SitePlayer determines from the contents of the file you select which kind of software is being loaded. The currently loaded Firmware or WebSite version is displayed for reference purposes.

The Update web page will appear slightly different depending on which browser you use. For example, if you are using Internet Explorer, the web page will look like this



In either case you will need to press the "Browse..." or "Choose File" button to select the appropriate file. ROM files are named as follows

SPT_Firmware_Vn_**nnaaa**.rom
SPT_Website_Vn_**nnaaa**.rom

where **n_naaa** is the version number which corresponds to version **n.naaa** of the ROM file.

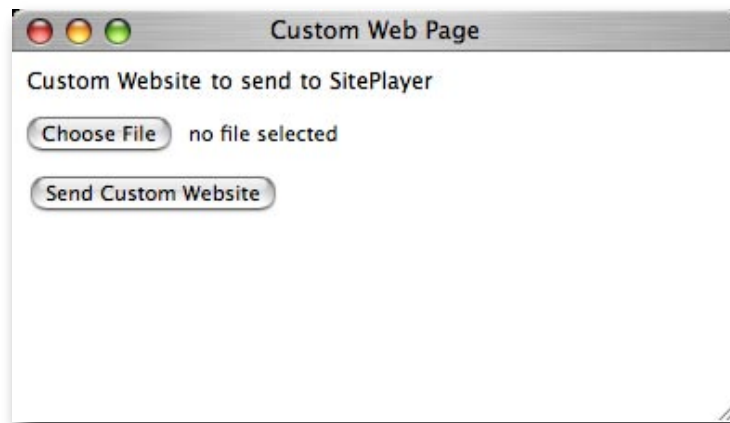
SitePlayer will attempt to save and restore the current configuration parameters after an update.

Uploading Custom Web Pages

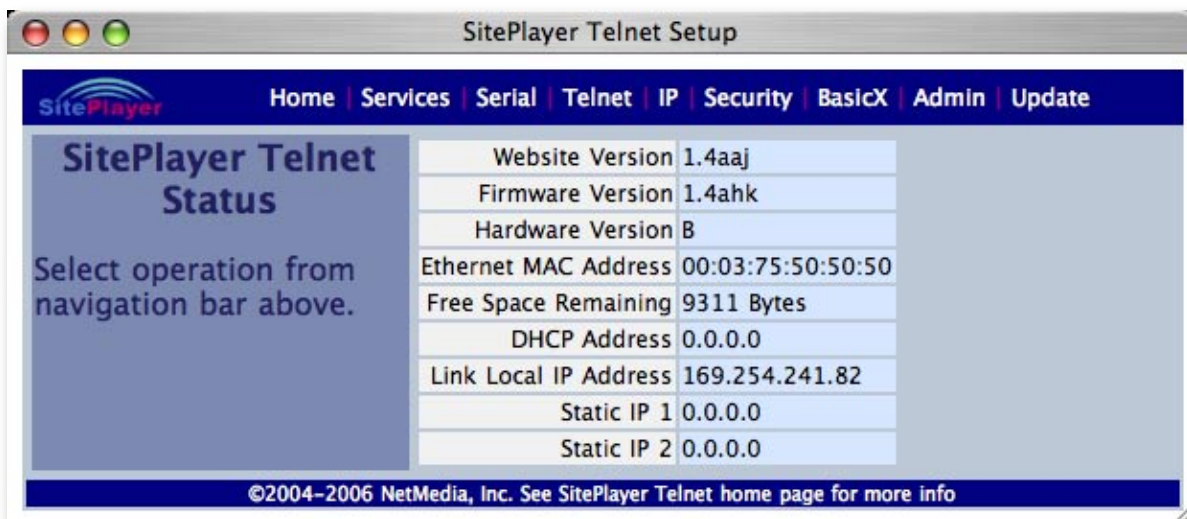
SitePlayer Telnet can be customized by uploaded custom web pages. These web pages are currently provided by NetMedia or its OEM partners. Since custom web pages may change the appearance and operation of SitePlayer Telnet, separate documentation will be provided for these web pages. In this section we will show you how to load the BasicX custom web page which is provided as part of the SitePlayer Telnet release. You can use this procedure to load other custom web pages as they are made available.

The BasicX custom web page allows you to control a BasicX processor connected to SitePlayer Telnet's serial port. You can Halt, Restart and force a connected BasicX processor to Wait for a Program Download. For these functions to work, you will connect the appropriate Tx/Rx pins to SitePlayer's Tx/Rx lines and also BasicX's ATTN line to SitePlayer's DTR line.

To begin loading the BasicX custom web page, make sure your SitePlayer can display the main SitePlayer Setup Web Page. Then in your web browser, change the URL of SitePlayer Telnet by replacing the text *index.html* with *custom.html*. This will display the following page

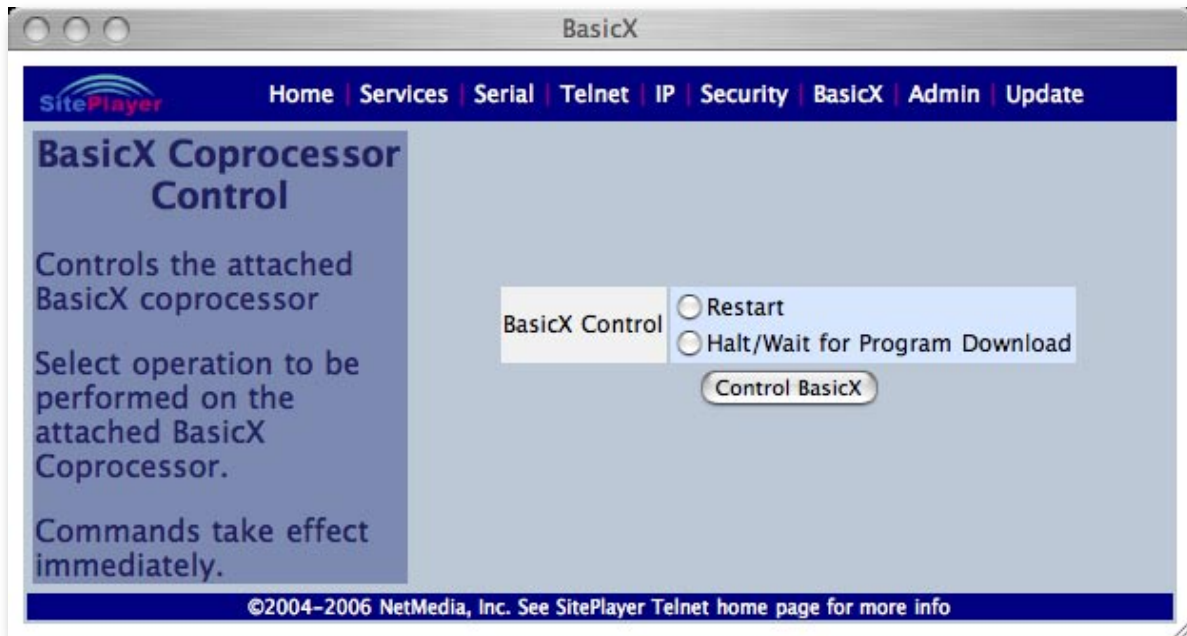


Select *Choose File* (or *Browse...* depending on your web browser). The file you will use in this example is named *SPT_BasicX_Website_Vn_nxxx.rom*, where *n_nxxx* is the version number of the custom website. Select *Send Custom Website* to upload the custom website to SitePlayer Telnet. After the custom web page is loaded, you will see the main Setup Web Page, but with a new addition to the navigation line:



Notice the BasicX navigation option available on the menu now.

If you select BasicX you will get the following web page:



The commands available on this page are

- **Restart** - Restarts execution of the BasicX processor
- **Halt/Wait for Program Download** - Halts the BasicX processor. You can then send a BasicX program through the network.

SitePlayer Services and Protocols

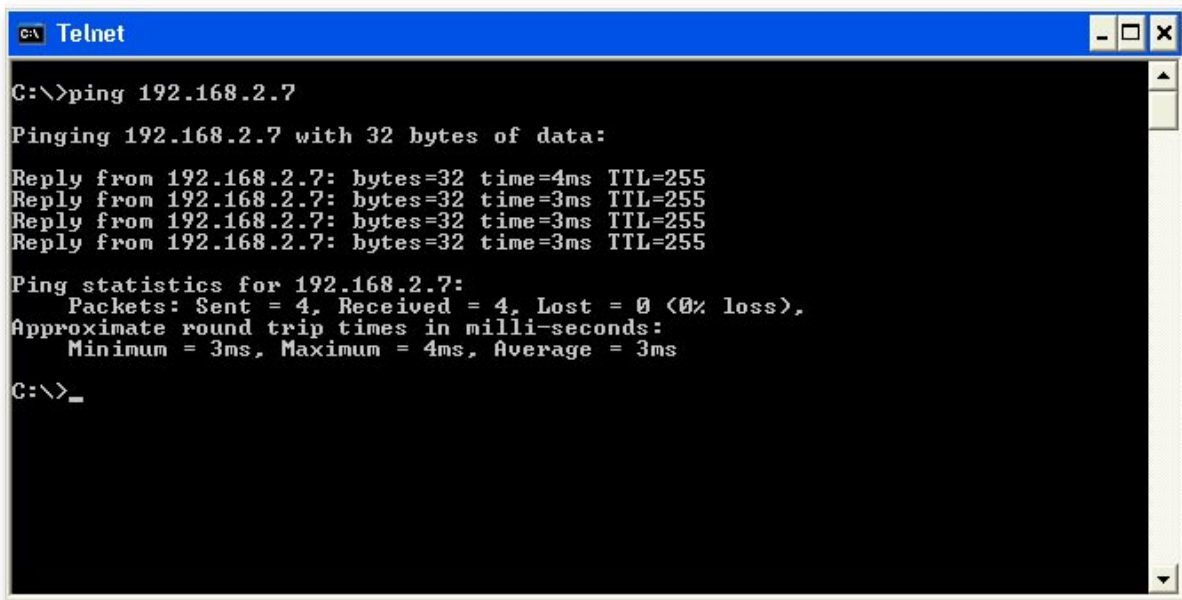
SitePlayer Telnet supports a variety of internet protocols and services.

Address Resolution Protocol ARP

SitePlayer uses ARP to convert a remote IP address to a MAC address so it can send packets directly to the remote device.

PING

SitePlayer will also respond to ping request. You can check that SitePlayer is connected to the network by pinging its IP address. Most operating systems have a **ping** command. For Windows you can issue the command at the DOS prompt of COMMAND.COM. Under Mac OS X, you issue the command in a terminal window. In Unix you can issue the command in any shell. Here is a sample output from a **ping** command under Windows:



```
C:\>telnet
C:\>ping 192.168.2.7

Pinging 192.168.2.7 with 32 bytes of data:

Reply from 192.168.2.7: bytes=32 time=4ms TTL=255
Reply from 192.168.2.7: bytes=32 time=3ms TTL=255
Reply from 192.168.2.7: bytes=32 time=3ms TTL=255
Reply from 192.168.2.7: bytes=32 time=3ms TTL=255

Ping statistics for 192.168.2.7:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 4ms, Average = 3ms

C:\>
```

Zero Configuration (ZeroConf) Link Local (LL) Address Acquisition

SitePlayer conforms to RFC 3927 (Dynamic Configuration of IPv4 Link-Local Addresses) which specifies how a host may automatically configure an interface with an IPv4 address within the 169.254/16 prefix. This means that SitePlayer can automatically configure itself with a unique IP address. This IP address, however, is only usable on the local link, which means that it is not routable outside the local link. So a SitePlayer using only a Link Local address can only communicate with devices which are on the same physical network. If you need SitePlayer to access or be accessed by devices outside of the local network, you will need to make sure DHCP is enabled or assign SitePlayer a unique static IP address

Multicast DNS (mDNS)

SitePlayer conforms to the IETF draft cheshire-dnsext-multicastdns-05 (<http://files.multicastdns.org/draft-cheshire-dnsext-multicastdns.txt>) which states

"Multicast DNS (mDNS) provides the ability to do DNS-like operations on the local link in the absence of any conventional unicast DNS server. In addition, mDNS designates a portion of the DNS name-space to be free for local use, without the need to pay any annual fee, and without the need to set up delegations or otherwise configure a conventional DNS server to answer for those names. The primary benefits of mDNS names are that (i) they require little or no administration or configuration to set them up, (ii) they work when no infrastructure is present, and (iii) they work during infrastructure failures."

SitePlayer uses mDNS to advertise its name and the services it has available. SitePlayer uses the standard mDNS port of 5353. It also receives DNS and mDNS queries using the standard DNS port of 53. This means that standard DNS clients can query SitePlayer.

Bonjour

The combination of ZeroConf LL and mDNS allows SitePlayer services to be browsable by Bonjour browsers. Bonjour is an Apple trademark which

"enables automatic discovery of computers, devices, and services on IP networks. Bonjour uses industry standard IP protocols to allow devices to automatically discover each other without the need to enter IP addresses or configure DNS servers. Bonjour is an open protocol which Apple has submitted to the IETF as part of the ongoing standards-creation process."

Dynamic Host Configuration Protocol (DHCP)

SitePlayer uses DHCP in the presence of a DHCP server to configure its IP address, gateway and network mask.

Transmission Control Protocol / Internet Protocol (TCP/IP)

TCP/IP is the core communications protocol that SitePlayer uses to communicate reliably on the network.

User Datagram Protocol (UDP)

UDP is used by such things as mDNS and the SitePlayer UDP serial protocol. UDP is not a reliable protocol and thus data sent with UDP is not guaranteed to arrive at its destination. If you use UDP to communicate with SitePlayer, you will need to take this into account.

Hypertext Transfer Protocol (HTTP)

HTTP is the web protocol which is used to communicate with SitePlayer's web server. SitePlayer's web server is primarily used to display and set SitePlayer's configuration.

Telnet

This service is used to pass data between a network connection and SitePlayer's serial port. The default TCP/IP port for Telnet is 23. The easiest way to attach to SitePlayer's serial port is to issue a telnet command. For example,

```
telnet 192.168.2.7
```

Characters typed into the Telnet program are sent to SitePlayer. Characters that SitePlayer receives are sent to the Telnet program.

SitePlayer can operate in binary or Network Virtual Terminal (NVT) mode. In binary mode it passes all characters unchanged back and forth through the Telnet port. In NVT mode it uses character 255 (FF hex) as an escape character to control behavior.

Daytime

This service is used to get the elapsed time that SitePlayer has been running. To get the elapsed time, you need to open a TCP/IP connection to SitePlayer on port 13 and read the data from that port. The easiest way to do this is to run the **telnet** program with port 13. For example,

```
telnet 192.168.2.7 13
```

Discard

This service throws away any TCP/IP data that is sent to it. This is used mostly for speed testing. The default port for discard is 9.

UDP Serial (UDPS)

This is a SitePlayer specific protocol which uses UDP to send and receive serial data. UDPS is a specialized protocol. Data that is received by SitePlayer's serial port is transmitted using UDP and the default port of 10001. SitePlayer can be configured to send UDPS data to a specific IP address or the first IP address that sends it UDPS data. If configured for a specific IP address, SitePlayer can send data at any time to that address. Otherwise, SitePlayer will wait to receive data so it can determine the response IP address. The response IP address can change depending on the last IP address SitePlayer received UDPS data from. This allows more than one computer to poll SitePlayer for data.

If you want to restrict SitePlayer to only communicate with one computer, then you can use the Security Web page to restrict port 10001 to that particular computer's IP address.

UDPS is useful in a polling environment where a master computer polls multiple slaves for data. The master computer would send a data packet which elicits a response from the device attached to SitePlayer. The data would then be sent to the master computer.

Telnet (TCP/IP) takes precedence over the UDPS. UDPS is disabled while a TCP/IP connection is active on the serial port.

One limitation of UDPS is that the source IP address in the UDP packet will be the first available IP address that SitePlayer uses. SitePlayer chooses the source IP address in the following order:

1. Static IP address 1
2. Static IP address 2
3. DHCP address
4. Link Local Address

So if you were to send a UDP packet, for example, to SitePlayer to its DHCP address, it would respond with its Static IP address #1 as its source IP address. If Static IP address #1 were not set, then it would use Static IP address #2 and so on.

Informative and Error Messages

You will encounter several informative and error messages as you use SitePlayer's setup web pages. These messages will appear after you have clicked on a form button on a web page. The messages are

Factory defaults are being set. Please wait...

You have requested that the SitePlayer is set back to its factory default state. Persistent storage is being cleared. This operation will take about a minute.

Parameters set OK

You have requested changing some parameters that did not require restarting SitePlayer. For example, changing serial port parameters or controlling the Link LED will give this message.

Restarting. Please wait...

You have requested to change some SitePlayer parameters that has resulted in SitePlayer restarting. Most parameters that are changed in SitePlayer require a restart. You will also get this message if you clicked on "Restart SitePlayer" in the Admin web page.

Bad flash file.

The flash file you attempted to update SitePlayer with was either corrupt or some kind of network error caused the file to be received incorrectly. Make sure you are sending a valid flash file to SitePlayer. If you have verified that the flash file sent to SitePlayer is valid, then try updating SitePlayer again with the same file. You may also get this message if your web browser does not correctly upload files. You could try switching to a different browser.

Bad request from browser or file not found.

You have requested a page on the SitePlayer that does not exist or your browser has sent a command that SitePlayer does not recognize.

Error setting parameters

There was an error in setting the parameters. Try the command again. You may also get this error if SitePlayer's persistent storage is full.

Firmware received OK. Reflashing, please wait...

SitePlayer has determined that you are attempting to upload a firmware file and that it was received with no errors. SitePlayer will now reflash its persistent storage with a copy of the newly received firmware. This operation will take several minutes.

Website feature/version mismatch

The website you uploaded to SitePlayer is not compatible with the firmware currently running in SitePlayer. This error is usually caused by attempting to load a website version into SitePlayer that is either too old or too new. SitePlayer's firmware is feature locked with certain website versions. If you attempt to load a website which does not have a compatible feature set, then you will get this error message.

Website received OK. Restarting...

SitePlayer has determined that you are attempting to upload a website file and that it was received with no errors. SitePlayer will now reflash its persistent storage with a copy of the newly received firmware. This operation will take several minutes.

End Plate Description

The SitePlayer Telnet system has two end plates which contain three connectors, an LED indicator and a reset button. The Power Over Ethernet (POE) version of SitePlayer also has two LEDs on it's RJ45 connector.



RS232C DB-9 Connector

Recessed Reset Button

The Recessed Reset Button is used to reset SitePlayer to its factory default state. See the **Performing Hardware Reset to Set SitePlayer to Factory Defaults** section on how to operate the button.

The DB-9 Connector is a male RS232C DTE connector. This means that it is electrically identical to a PC serial port connector.

Pin	Name	Direction
1	DCD	→
2	RX	→
3	TX	←
4	DTR	←
5	GND	
6	DSR	→
7	RTS	←
8	CTS	→
9	RI	→

To SitePlayer	→
From SitePlayer	←



Non-POE

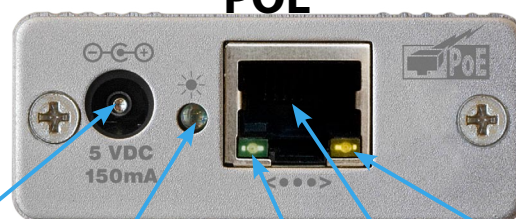


Blue LED Indicator

Ethernet 10BaseT RJ45 Connector

Power Connector
7.5VDC

POE


Power Connector
(optional) 5VDC

Blue LED Indicator

Green Link LED

Orange Power LED

Ethernet 10BaseT RJ45 Connector

The Blue LED Indicator has multiple functions

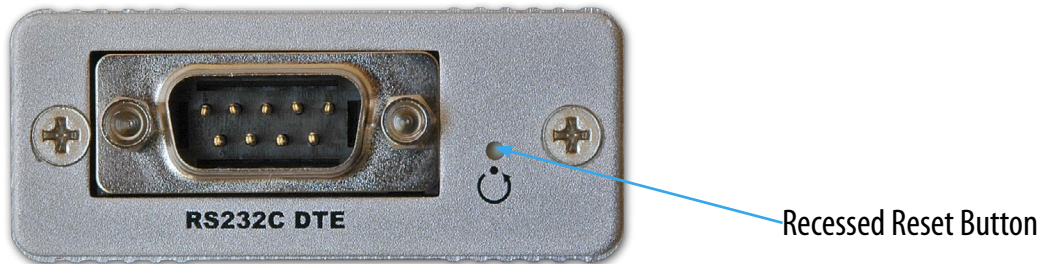
- During normal operation it indicates that the link is active. It stays constantly lit on an active link.
- When SitePlayer is being reprogrammed the LED will flash indicate that the internal flash is being erased and reprogrammed. This will happen when new Firmware or Website is software is loaded or when the hardware reset button is pressed.

The Ethernet 10BaseT RJ45 Connector is used to connect to the Ethernet network. The POE version contains a green link LED by the RJ45 connector which indicates that there is a valid link and also an orange Power LED which indicates that SitePlayer has power (either POE or optional 5VDC).

The Power Connector label indicates the voltage that SitePlayer is rated for. The current rating on the Power Label is the maximum power SitePlayer is rated for, although it typically consumes less than 150ma.

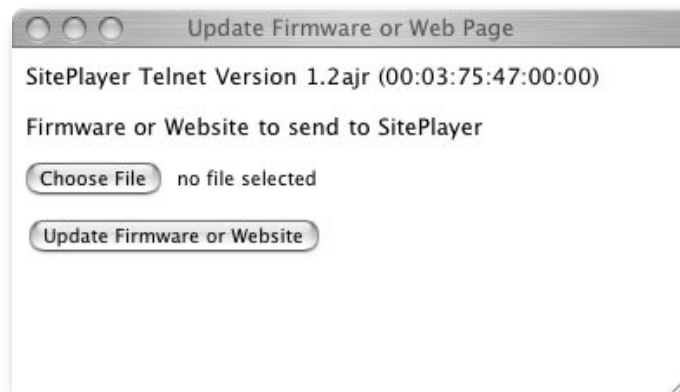
Performing Hardware Reset to Set SitePlayer to Factory Defaults

If for some reason SitePlayer needs to be reset to its factory default state and you cannot access the SitePlayer web page to perform this, you can use the recessed reset button located to the right of the DB-9 connector. Resetting SitePlayer to its factory defaults erases its web page and clears out the persistent storage. Resetting to factory defaults will not change the firmware version loaded into SitePlayer.



To perform a hardware reset, remove the power connector and insert a paper clip into the recessed reset hole. You will feel the reset button depress. With the reset button still depressed, plug the power connector back in. The blue LED will start blinking for a while (you can now remove the paper clip). While the LED is blinking, do not remove power to SitePlayer. The reset process is complete when the LED stops blinking. The LED will either be lit constantly if SitePlayer is plugged into an active network, or the LED will be off.

All your configuration settings are now erased. The factory WebSite is also erased and a minimal website is present. When you connect to SitePlayer you will see a web page that looks like this:



You will need to reload the WebSite ROM file. See the Update Web Page section for information regarding this.

Appendix A

AT Command Set

SitePlayer supports TCP/IP and UPD connection control through the serial port by using the AT command set. The AT command set was developed by Hayes to initiate and control modem connections. SitePlayer uses a subset of the AT command set and extends it for network connection control. This means that you can initiate and terminate TCP/IP and UPD network connections from your serial attached device rather than having to use the web interface. The command set is called "AT-Command set" because most commands begin with the letters AT.

AT-Command mode must be enabled, before SitePlayer can respond to AT commands. You can enable AT command mode through the web interface in the Telnet page by selecting "AT-Command" under SitePlayer Mode. Once AT-Command is selected, SitePlayer will not act as a Client or Server until the appropriate AT-Command is issued through the attached serial port.

Commands listed below must be followed by carriage return (except the A/ command). Some commands take an optional argument which is denoted as [*argument*] below. Some commands take a numeric argument which is denoted as [*n*] below. Usually the number 0 means turn the option off, while 1 means turn the option on. If the optional numeric argument is not present, then the number 0 is assumed, which turns the option off. The maximum command line that may be issued is 50 characters. If you issue more than 50 characters, the first 50 will be acted upon as if a carriage return had been issued. Commands may be in either upper or lower case.

A/	Repeat last command. The last issued command line is repeated as if it were typed in again. Note, that a carriage return is not necessary after this command.
AT[<i>command</i>]	Attention. This is what all commands are prefixed with. SitePlayer will respond with "OK" if no command is issued. All commands must be preceded with AT. You can issue multiple commands per line by issuing an AT followed by multiple commands separated by spaces. For example, AT ATE1 V0 ATZ DT52.230.231.8
DC	Set SitePlayer into Client mode and then exits AT command mode until SitePlayer is reset or power cycled. You will not be able to re-enter AT command mode until SitePlayer is reset, power cycled or Force-AT-Command mode is initiated. You will need to make sure the Remote IP address and port are specified in the Web page. If you have multiple commands on a line this needs to be the last command.
DL[: <i>port</i>]	Listens on <i>port</i> for a TCP/IP connection. If <i>port</i> is not specified, the Telnet port in the Services web page (usually port 23) is assumed. For example, ATDL ATDL:231

DS	Sets Siteplyer into Server mode and then exits AT command mode. You will not be able to re-enter AT command mode until SitePlayer is reset, power cycled or Force-AT-Command mode is initiated. If you have multiple commands on a line this needs to be the last command.
D <i>Tip-address[:port]</i>	Connects to IP address <i>ip-address</i> which is in the form nnn.nnn.nnn.nnn using TCP/IP. You can optionally follow the <i>ip-address</i> with a port number. If <i>port</i> is not specified, the Telnet port in the Services web page (usually port 23) is assumed. For example, atdt45.92.253.1 ATDT192.168.2.123:45
D <i>Uip-address[:port]</i>	Sets up IP address <i>ip-address</i> which is in the form nnn.nnn.nnn.nnn to be the UDP serial IP address. If <i>port</i> is not specified, the UDP Serial port specified in the Services web page (usually port 10001) will be used. For example, ATDU192.168.2.123 ATDU124.456.12.7:1002
E[<i>n</i>]	Controls whether characters typed in command mode will echo. 0 - Commands are not echoed. 1 - Commands are echoed as they are typed (default).
H[<i>n</i>]	Hang up (disconnect). The current TCP/IP connection is terminated.
I[<i>n</i>]	Display Identifier. Displays information of SitePlayer version (including the MAC address). If argument <i>n</i> is 1 then four IP addresses are displayed (Fixed IP 1, Fixed IP 2, DHCP and Link Local). For Example, ATI <i>SitePlayer Telnet V1.2anm (00:03:75:7A:14:2C)</i> <i>Copyright (C) 2001-2005 NetMedia, Inc.</i> OK ATI1 <i>43.61.1.231</i> <i>0.0.0.0</i> <i>192.168.2.10</i> <i>169.254.41.213</i> OK
O[<i>n</i>]	Go back online. You can issue this command to go back online (out of command mode) if a connection is still active. Argument <i>n</i> is ignored.
Q[<i>n</i>]	Controls whether or not a response to a command will appear. 0 - Responses to commands appear (either as verbose text or numeric responses) 1 - Responses to commands don't appear.
V[<i>n</i>]	Controls response verbosity. 0 - Responses are not verbose (they are numeric) 1 - Responses are verbose (they are text and this is the default)

Z[n]	Set to factory defaults. Resets various options to their factory default. This is equivalent to issuing an ATE1 Q1 V1 command
others	SitePlayer will respond with OK to other AT commands, but they will not be acted on. For example, AT S7=45 S0=0 L1 X4 &c1 will generate an OK response, although SitePlayer does not act upon the commands.
+++	Go into command mode. The "+++" sequence needs to be preceded and followed by a minimum of 1 second of no activity on the serial line. This is useful if you want to issue AT commands once a connection is established. For example you can issue the ATH command to terminate a connection: <i>1-second-delay+++1-second-delayATH</i>
backspace	When a backspace (control-H or 08) character is encountered the last character typed is erased.

Responses to various commands will appear as text in verbose mode (ATV1) or as numeric responses when verbose mode is off (ATV0). Numeric response codes are listed parenthetically.

OK (0)	The current command has successfully completed.
CONNECT (1)	Currently not returned.
RING (2)	Currently not returned.
NO CARRIER (3)	The remote TCP/IP connection was terminated.
ERROR (4)	There was an error in a command. Usually this means that the ip-address:port field in a ATDT or ATDU command was not formatted properly.
CONNECT ip-address:port (5)	This is displayed when a remote TCP/IP connection is established. The CONNECT message will be displayed for connections which are initiated by SitePlayer or connections which are made to SitePlayer. The remote ip-address and port the connection was established on will be displayed.
NO DIALTONE (6)	Currently not returned.
BUSY (7)	Currently not returned.
NO ANSWER (8)	Currently not returned.
CONNECT ip-address:port (9)	Currently not returned.

Telnet Current Connection State

The Telnet web page lists the various states that SitePlayer Telnet may be in. The states are specific to TCP/IP and are generally not of much interest to the average user. SitePlayer stays in most states for a short period of time. States marked with * below are more likely to be seen when viewing the current connection state.

- **TRYING*** - SitePlayer (Client) is attempting to connect to a server.
- **LISTEN*** - SitePlayer (Server) is listening for a connection.
- **SYN_SENT** - A TCP/IP SYN has been sent during connection processing.
- **SYN_RECEIVED** - A TCP/IP SYN has been received during connection processing.
- **ESTABLISHED*** - A remote connection is established.
- **FIN_WAIT_1** - Waiting for a FIN
- **FIN_WAIT_2** - Waiting for a FIN
- **CLOSE_WAIT** - A connection has been closed by SitePlayer and SitePlayer is waiting for remote end to close its connection.
- **CLOSING** - A connection close is in progress.
- **LAST_ACK** - The last ACK has been sent before a connection is terminated.
- **TIMEWAIT** - SitePlayer waits a certain period of time after a connection closes.
- **CLOSED** - The connection is closed.
- **IDLE*** - SitePlayer is idle waiting for the retry period to expire or SitePlayer is in AT command mode.

Installing a Zeroconf / Bonjour Browser Under Windows

Although there is nothing currently built into Windows to support browsing for Bonjour services, there are several programs available free of charge.

The easiest to use and install is "Bonjour Browser" which is written by Apple. The software is open-source and freely available. An executable version of the program can be found at

<http://www.SitePlayer.com/telnet/>

Source code and a Windows SDK is available at

<http://developer.apple.com/networking/bonjour/>

If you are running Windows 2000 or Windows XP then you can download Porchdog Software's Howl. Howl is open-source and royalty-free and installs a plug-in into IE which allows you to browse for Bonjour services via IE. See

<http://www.porchdogsoft.com/products/howl/>

Howl is available for Windows 2000/XP, Linux, FreeBSD and Mac OS X. Although, you will not need to install it under Mac OS X, since Bonjour browsing is supported with the Safari web browser.

A Java product which lets you browse for Bonjour services is Jmdns. This is a Java program and requires that you have a Java virtual machine installed. This may be the only route available if you have Windows 95/98/NT or an operating system that the above programs don't support. See

<http://sourceforge.net/projects/jmdns/>

Jmdns is also open-source and royalty-free.

Novell also has a Mono/.NET platform implementation available under GPL at

<http://forge.novell.com/modules/xfmod/project/?mdnsresponder>

Telnet Network Virtual Terminal (NVT)

SitePlayer supports a limited set of Network Virtual terminal (NVT) commands primarily in assisting in setting up serial port communication parameters such as baud rate, character size and parity. By default SitePlayer operates in a binary mode which ignores all NVT commands and just passes characters unchanged between the serial port and the internet connection. You can enable NVT mode by selecting NVT in the Data Transfer Mode in the Telnet web page. In NVT mode, NVT commands are preceded by a 255 character (FF hex). To send a 255 character, you must send two 255 characters. NVT mode is defined by various RFCs. The RFCs that SitePlayer supports are

- RFC854 - Telnet Protocol Specification
- RFC855 - Telnet Option Specification
- RFC856 - Telnet Binary Transmission
- RFC857 - Telnet Echo Option
- RFC858 - Telnet Suppress Go Ahead Option
- RFC2217 - Telnet Com Port Control Option

The RFCs are available for viewing at <http://www.ietf.org/rfc.html>.

SitePlayer supports the following NVT options

TRANSMIT BINARY	0
ECHO	1
SUPPRESS-GO-AHEAD	3
COM-PORT-OPTION	44

The various sub-options for the COM-PORT-OPTION option are listed below along with a note if they are supported

SIGNATURE	Supported
SET-BAUDRATE	Supported
SET-DATASIZE	Supported
SET-PARITY	Supported
SET-STOPSIZE	Supported
SET-CONTROL	Supported
NOTIFY-LINESTATE	Not supported - no line state information is currently sent
NOTIFY-MODEMSTATE	Not supported - no modem state information is currently sent
FLOWCONTROL-SUSPEND	Supported
FLOWCONTROL-RESUME	Supported
SET-LINESTATE-MASK	Not supported since no line state information is currently sent
SET-MODEMSTATE-MASK	Not supported since no modem state information is currently sent
PURGE-DATA	Supported

Adding Route to Windows so Link Local Devices Can be Accessed

Windows supports Link Local (LL) addressing. If you are connected to a network and an IP address cannot be obtained manually or automatically (via DHCP), Windows will choose a LL address. These addresses are in the form 169.254.x.y, where x.y are randomly chosen numbers such that they are unique on the network. While Windows is using the LL address it maintains a route to the LL address subnet. This means that it can communicate with LL devices such as SitePlayer.

In most cases once Windows obtains an IP address via DHCP, SitePlayer will also obtain a DHCP address and accessing the device is not an issue. There may be cases, however, where the DHCP server does not assign an IP address to SitePlayer. This can occur when DHCP has been disabled in SitePlayer or the DHCP server's IP address allocation rules prevent an address from being assigned. In these cases, SitePlayer can only be accessed via it's LL address.

Unfortunately, once Windows obtains a non LL address (either manually or through DHCP), it removes its route to the LL address subnet. This has the effect of not being able to communicate with devices which are addressed only through 169.254.x.y. The easiest way around this is to add a route to the LL subnet so that Windows knows where to send packets that are addressed to LL devices. This may be accomplished by running COMMAND.COM and typing ROUTE PRINT

```

C:\WINDOWS\System32\command.com
C:\>ROUTE PRINT
=====
Interface List
0x1 ..... MS TCP Loopback interface
0x10003 ...00 10 4b 0f d1 8d ..... 3Com EtherLink XL 10/100 PCI TX NIC <3C905B-
TX>
=====
Active Routes:
Network Destination    Netmask          Gateway          Interface        Metric
0.0.0.0                0.0.0.0          192.168.2.253    192.168.2.155    20
127.0.0.0              255.0.0.0        127.0.0.1        127.0.0.1        1
169.254.0.0            255.255.0.0      192.168.2.155    192.168.2.155    1
192.168.2.0            255.255.255.0    192.168.2.155    192.168.2.155    20
192.168.2.155          255.255.255.255  127.0.0.1        127.0.0.1        20
192.168.2.255          255.255.255.255  192.168.2.155    192.168.2.155    20
224.0.0.0              240.0.0.0        192.168.2.155    192.168.2.155    20
255.255.255.255        255.255.255.255  192.168.2.155    192.168.2.155    1
Default Gateway:       192.168.2.253
=====
Persistent Routes:
None
C:\>

```

You will need the interface IP address under the "Interface" column before the "Default Gateway" line. In this example it is **192.168.2.155**.

Type the following command substituting your interface IP address for **192.168.2.155**:

ROUTE ADD 169.254.0.0 MASK 255.255.0.0 192.168.2.155

This will add a route so that link local devices can be accessed. You will need to do this every time the computer is rebooted, unless you make the route permanent by typing

ROUTE -p ADD 169.254.0.0 MASK 255.255.0.0 192.168.2.155

TCP/IP Tuning Considerations

There are many ways in which TCP/IP implementations may be tuned. Some tuning may improve performance. Due to the design of SitePlayer and its small serial port buffers, some communications to other TCP/IP machines may not be as optimal as can be. In particular a feature of TCP/IP called *Delayed ACKs* will cause performance decreases in communications between SitePlayer and certain computers. By reducing or disabling delayed ACKs, you can get a substantial throughput improvement. Various operating systems control delayed ACKs differently. Here is how you can turn off (or reduce) delayed ACKs for the most popular operating systems.

Windows

Delayed ACKs can be reduced in Windows through a registry change. Normally an ACK is sent for every other TCP segment received on a connection, unless the delayed ACK timer (200 milliseconds) expires. The delayed ACK timer for each interface can be adjusted by setting the value of the TCPDelAckTicks registry entry (HKLM\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters\Interfaces\<interface>). Changing the value to 20ms will substantially improve performance.

If you are writing your own programs, you can turn off ACK delays at the socket level rather than for the whole system. Use setsockopt with the TCP_NODELAY option. For more information regarding tuning Windows 2000/XP see

<http://www.microsoft.com/technet/itsolutions/network/deploy/depovg/tcpip2k.mspix>

Mac OS X or FreeBSD

Under Mac OS X or FreeBSD you can modify the delayed ACK time via the sysctl command. To see what sysctl parameters may be modified you can type

```
sysctl -A
```

You can display the value of a particular sysctl parameter by typing

```
sysctl -A parameter
```

The parameters which are of interest for delayed ACKs are ***net.inet.tcp.delacktime*** and ***net.inet.tcp.delayed_ack***. In some implementations ***net.inet.tcp.delacktime*** does not work, so you can turn ACK delays off completely with ***net.inet.tcp.delayed_ack***:

```
sudo sysctl -w net.inet.tcp.delayed_ack=0
```

This is not the most ideal solution, but it does work. If you are writing your own programs, you can turn off ACK delays at the socket level rather than for the whole system. Use setsockopt with the TCP_NODELAY option.








Linux

You cannot disable or change the delayed ACK time via sysctl, but Linux's implementation of delayed ACKs is very adaptive and results in a minimal performance loss. If you are writing your own programs, you can turn off ACK delays at the socket level. Use setsockopt with the TCP_NODELAY or TCP_QUICKACK option.

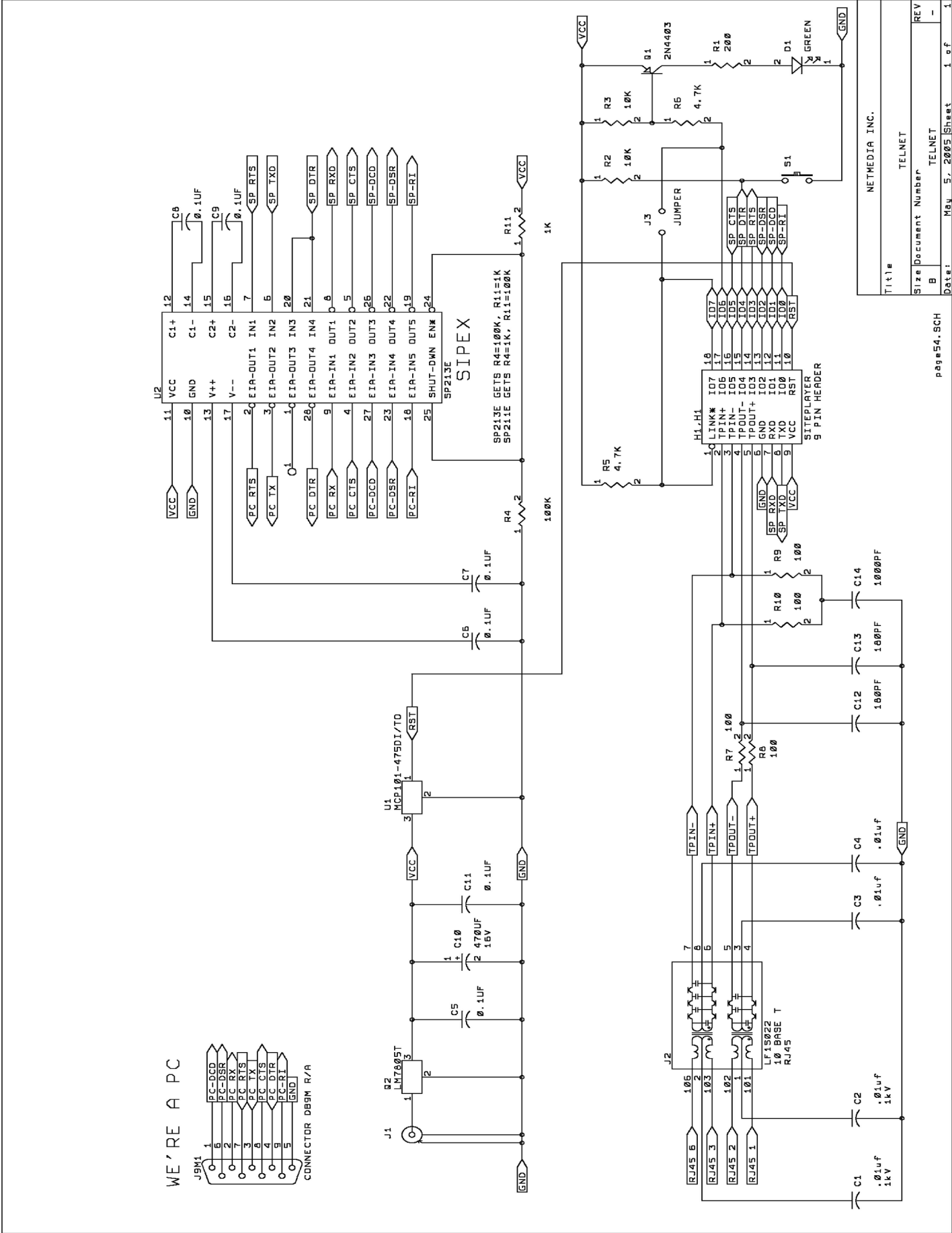
Appendix B

DB-9 Null Modem Cable Wiring

If you need to connect SitePlayer Telnet to another DTE device such as a PC Serial port, you will need to connect it using a null modem cable. A null modem cable switches the data lines and other control lines around. The following table illustrates how to wire a proper DB-9 Null modem cable:

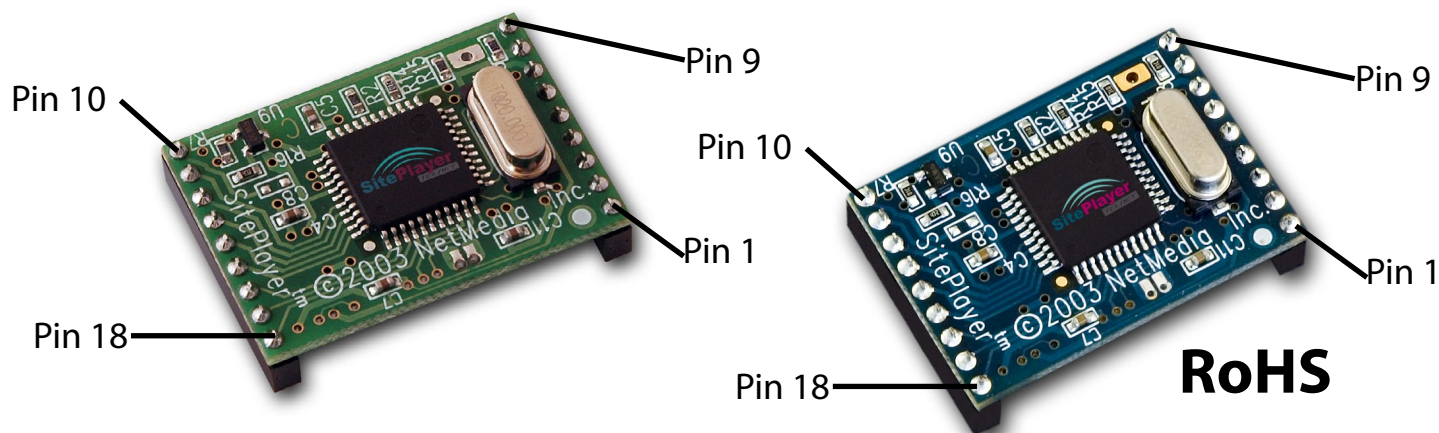
Side A		Connector Wiring	Side B	
Signal	Pin		Pin	Signal
DCD	1		4	DTR
DSR	6			
RX	2		3	TX
TX	3		2	RX
DTR	4		1	DCD
			6	DSR
GND	5		5	GND
RTS	7		8	CTS
CTS	8		7	RTS

Telnet Carrier Schematic



Telnet Module Pin-Out

The SitePlayer Telnet module consists of a circuit board with a dual-row 18-pin header. Pin 1 is identified with a white dot. The RoHS version of the module is blue, while the non-RoHS version is green



Pin	Name	I/O	Description
1	LINK*	O	Link Status
2	TPin+	I	Twisted Pair input. Receives 10 Mbits/s differential Manchester encoded data from the 10BaseT transformer.
3	TPin-		
4	TPout-	O	Twisted Pair output. Transmits 10 Mbits/s differential Manchester encoded data to the 10BaseT transformer.
5	TPout+		
6	GND	-	Device ground.
7	RxD	I	Receive serial data.
8	TxD	O	Transmit serial data.
9	Vcc	-	Device 5V power.
10	RST	I	Hardware reset.
11	RI	I	Ring indicator.
12	DCD	I	Data Carrier Detect.
13	DSR	I	Data Set Ready.
14	RTS	O	Request to send. Used for hardware flow control.
15	DTR	O	Data Terminal Ready. Factory default reset. Resets device to factory defaults. Hold pin to ground before applying power or RST. Allow to float once power is applied. Factory default reset will take approximately 15 seconds to complete during which time power should not be removed.
	FDRST	I	
16	CTS	I	Clear to Send. Used for hardware flow control.
17	LED	O	Status LED. Used to indicate online-status and reflashing status. Can also be user controlled.
18	Lsense*	I	Senses status of LINK* signal. This must be connected to pin 1 LINK*. SitePlayer uses this to determine if cable is plugged in and for other network functions.

